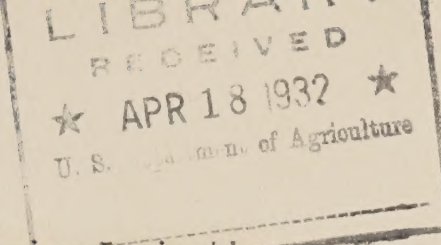


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DRAINAGE BY PUMPING

A radio talk prepared by A. Lincoln Fellows, Senior Irrigation Engineer, Division of Irrigation, Bureau of Agricultural Engineering, and delivered in the U. S. Department of Agriculture period of the Western Farm and Home Hour, Thursday, March 10, 1932, through Station KGO and seven other stations associated with the NBC - KGO network, Pacific Division, National Broadcasting Company.

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It was originally planned that A. T. Mitchelson should speak to you today upon the subject "Water spreading as an assurance against drought", but, the investigations which Mr. Mitchelson is carrying on have not yet reached the stage where he is willing to give out his conclusions as he thinks that he can give you more complete information a little later. In view of this situation it was decided that we should discuss a subject which may be considered as in a measure introductory to his talk.

This subject is "Drainage by Pumping". The analogy between the subjects will be recognized when it is remembered that the object of water spreading is to put water into the soil in order that it may be pumped out again for use in irrigation. Similar conditions are found in drainage by pumping. In the former case, water is intentionally stored underground in order that it may be used later. When we speak of drainage we generally think of removing surplus water placed in the ground either by nature or through the application of water in connection with irrigation.

The plan usually adopted in the past has been the construction of either open or covered drainage ditches. More recently, in certain favored sections, the groundwater table has been lowered by using pumps. By favored sections I refer to those localities where conditions are favorable to drainage by pumping. A number of different objects may be attained in the drainage of agricultural lands. The first objects thought of are, (1) the lowering of the water table in the soil in order that the root zone of crops may be drained and aerated and, (2) the prevention of accumulations of alkali upon and in the surface soil. Perhaps of equal importance -- in some sections of greater importance -- is the value of the water taken from beneath the surface of the ground for further irrigation.

I have suggested that drainage by pumping is practicable only under certain favorable conditions. Professor Walter W. Weir, in University of California Bulletin No. 382, entitled "Pumping for Drainage in the San Joaquin Valley, California", makes this statement relative to fundamental requirements: "It would appear from the data which have been collected from various sources that there is justification in making a few broad and general statements regarding the fundamental requirements to be met in order to be successful in drainage by pumping.

(1) There must be a direct connection between the groundwater table near the surface and the deeper lying pervious water-bearing strata from which the water is pumped. In other words, the water table as first encountered must not have a layer of dry or impervious material between it and the normal groundwater.

(2) The underlying water-bearing strata must be porous enough to give up their water freely under pumping.

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(3) There must be sufficient water pumped from the lower strata to cause that which is near the surfact to move downward by gravity to replace that which has been pumped."

The physical conditions must be carefully studied before deciding upon this method of lowering the water table. The geology, soils, topography and size of the district to be drained, as well as costs, markets, and other details that ought to be considered in any farming venture enter into the problem.

The size of the district is of importance for the reason that it is generally practicable to lower the water table in this way in large areas only. The entire farming population of the district must be interested and share in the cost as well as in the benefits of the project.

All of the problems incidental to pumping for irrigation, such as quantity of water to be removed, location, depth, size, casings, developing and testing of the wells after construction, character and capacity of pumping unit and other incidental details are to be considered. All of these matters are discussed in the bulletin to which I have referred.

I call your attention also to two bulletins issued by the United States Department of Agriculture which, with the Bulletin to which I have referred, may be obtained from the broadcasting station to which you are now listening. These are Department Bulletins No. 1408, entitled "Structures used in Draining Agricultural Land" and No. 1456, entitled "Drainage by Means of Pumping from Wells in Salt River Valley, Arizona". Both of these contain information that will be of value in considering this method of relieving water-logged land conditions. There are also several other books and bulletins bearing upon the subject which are available to those who wish to go deeper into the matter.